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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/531,679	03/20/2000	Osamu Kodama	M1866-24	6246

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EXAMINER

BRYANT, DAVID P

ART UNIT PAPER NUMBER

3726

25

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/531,679

Applicant(s)

KODAMA ET AL.

Examiner

David P. Bryant

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 3-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☒ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☒ Interview Summary (PTO-413) Paper No(s). 25.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.                      6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 1, 2003, has been entered. As noted in the attached Interview Summary, the Notice of Abandonment mailed on December 2, 2003, was premature, and has been rescinded. The examiner extends his apologies for the improper abandonment.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

**Claims 3-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Amended claims 3 and 4 now include limitations pertaining to the L10 life ratio of the bearing parts compared to conventional bearing parts. Although applicant's Table 3 (on page 10)

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discloses the claimed L10 ratio of at least 3 (specifically, the table lists a 3.11 ratio compared to 1.0 for the conventional bearing), there is no conclusive evidence, in the form of Tables or Examples, to suggest that a retained austenite *anywhere* in the range of 30%-80% will produce this desired L10 life ratio. In fact, as far as the examiner can tell, the specific percentage of retained austenite in applicant's "test pieces" is never even disclosed. In the prior art, there are examples to suggest that an increase of only a few percent of retained austenite can drastically affect the L10 life ratio of a bearing part. (For instance, see Table 1 in column 6 of Maeda et al., U.S. Patent No. 6,158,263.) How does the disclosed method achieve the desired L10 life ratio of at least 3 *throughout* the retained austenite range of 30%-80%, when the prior art suggests otherwise? The specification is considered non-enabling for the newly claimed subject matter.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 3-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claim 3:

The preamble to the claim recites "a bearing structure." Throughout the body of the claim, various terminology such as "bearing part," "rolling raceway surface," "roller," "cylindrical bearing," "cylindrical roller bearing," "needle roller bearing," and "bearing" is used. It is unclear whether the "bearing structure" in the preamble relates to one of the parts listed in the claim, some of the parts listed in the claim, or a combination of all of the parts listed in the claim. This is particularly confusing, since the last step of the claim recites "forming the bearing

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part” rather than forming the bearing structure. The claim should be carefully amended to maintain consistent terminology.

In line 4, “the roller” and “the cylindrical bearing” lack proper antecedent.

In line 6, “carbonitridizing” is apparently a typo, and should be changed to --carbonitriding--. Also, “a surface of said bearing” is indefinite, as it is unclear whether this refers to “the cylindrical bearing” (line 4) or “one of a cylindrical roller bearing and a needle roller bearing” (line 5).

In line 7, “increased by about 30%” is indefinite (i.e. with respect to what?). Is applicant implying that the “surface of said bearing” (whatever this may be referring to) already contains a certain amount of retained austenite, and the carbonitriding step increases this amount? And is this carbonitriding step being performed on a different part than the first carbonitriding step is being performed on?

In the “subjecting” step of lines 8-9, is “said roller” one of the “bearing part” (line 2) or “surface” (line 6) that has previously been subjected to carbonitriding, or some other bearing component altogether?

Is the “forming the bearing part” step of lines 10-12 some kind of broadly recited assembly step where the previously recited components are combined to form a “bearing part” or is applicant referring to only a specific one of the previously recited components?

Claim 4:

In lines 8-10, the step for “forming said rolling raceway” is indefinite, since the rolling raceway must inherently be formed prior to performing the claimed “carburizing” and “carbonitriding” steps. It is thus unclear what this “forming” step encompasses.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (AAPA) in view of Tsushima et al. (U.S. Patent No. 5,658,082) and Maeda et al. (U.S. Patent No. 6,158,263).**

AAPA is found on page 2 of the specification, and teaches extending the life of cylindrical roller bearings or needle roller bearings, as exemplified in Unexamined Patent Publication (Kokai) No. 5-239550. Longer life is achieved by improving a retained austenite amount of a surface layer by about 30%, and subjecting the surface layer to a specific heat treatment for applying a residual compression stress. Thereafter, the part is subjected to specific surface machining so that the surface is formed with micro concavo-convex portions in random directions.

Thus, AAPA teaches the method essentially as claimed, but lacks (1) a specific teaching of "carbonitriding" as claimed, and (2) an L10 life ratio of greater than or equal to three.

Tsushima et al. disclose that carburizing treatments (such as that used in AAPA) for bearing components are insufficient for extending their service lives. To address these concerns, Tsushima et al. teach improved wear resistance and heat resistance may be obtained by carbonitriding the bearing structures to produce an amount of retained austenite in the surface layer in the range of 20%-40%. As disclosed in column 2 (lines 63-66), Tsushima et al. perform

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the carbonitriding step on the bearing race member 23 (comprised of inner race 2 and outer race 3) and rollers 4 of roller bearing 1 (see Figure 1). The carbonitriding steps also enhance the L10 life ratio of the bearing parts, as disclosed in column 7 (lines 9-39) and Table 2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to subject AAPA's bearing structure to carbonitriding, as taught by Tsushima et al., to further extend the service life thereof.

It is noted that the test sample listed in Table 2 of Tsushima et al. (i.e. Steel C, having a retained austenite amount of only 25%) exhibits an L10 life ratio of between 2.0 and 2.2, depending on the carbonitriding process used. However, as disclosed by Tsushima et al., the amount of retained austenite in the surface layer may be as high as 40%. As exemplified by Maeda et al. in Table 1 in column 6, the L10 life ratio of carbonitrided bearing parts fluctuates as the amount of retained austenite is increased. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have increased the amount of retained austenite in the surface layer of the bearing parts of Tsushima et al., as taught by Maeda et al., to an amount sufficient to produce an L10 life ratio of greater than or equal to three.

#### ***Contact Information***

Telephone inquiries regarding the status of this application, or other general questions, by persons entitled to the information, should be directed to the group clerical personnel. In as much as the official records and applications are located in the clerical section of the examining groups, the clerical personnel can readily provide status information. M.P.E.P. 203.08. The Group clerical receptionist number is (703) 308-1148.

If in receiving this Office Action it is apparent to applicant that certain documents are missing, e.g., copies of references cited, form PTO-1449, form PTO-892, etc., requests for copies of such papers or other general questions should be directed to Tech Center 3700 Customer Service at (703) 306-5648, or fax (703) 872-9301 or by email to [CustomerService3700@uspto.gov](mailto:CustomerService3700@uspto.gov).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to **David Bryant** whose telephone number is **(703) 308-1859**. Draft amendments or proposed changes to the application may be faxed directly to the examiner at any time via RightFAX at (703) 746-4213 (formal inquiries or responses should NEVER be faxed to this number). The examiner can normally be reached on **Mondays-Thursdays from 6:30 AM to 5:00 PM**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The official fax phone number for the organization where this application or proceeding is 703-872-9306 for all communications (including After Final communications).

Other helpful telephone numbers are listed for applicant's benefit.

Allowed Files & Publication	(703) 308-6789 or (888) 786-0101
Assignment Branch	(703) 308-9723
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Drawing Corrections/Draftsman	(703) 305-8404/8335
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